Claims

1. Reactor (1) at least comprising, connected with each other in fluid-communicating fashion,

- a reaction area (2),

wherein the reaction area (2) comprises at least one solid-state catalyst (3);

- a coolable heat exchanger area (4)

wherein the heat exchanger area (4) comprises at least one housing (5),

wherein the housing (5) accommodates at least partially an insert (6),

wherein the insert (6) comprises a plurality of elements (7).

2. Reactor (1) according to claim 1, wherein the insert (6) comprises at least one of the following properties determined according to the test methods described herein:

(A) a heat pressure quotient $\Lambda 1$ at an empty pipe speed v of 0.485 m/s of greater than 1.11 $W/m^2/K/(mbar/m)$;

(B) a heat pressure quotient $\Lambda 2$ at an empty pipe speed v of 0.728 m/s of greater than 1.53 $W/m^2/K/(mbar/m)$;

(C) a heat pressure quotient $\Lambda 3$ at an empty pipe speed v of 0.970 m/s of greater than 1.81 $W/m^2/K/(mbar/m)$.

3. Reactor (1) at least comprising, connected with each other in fluid-communicating fashion,

- a reaction area (2),

wherein the reaction area (2) comprises at least one solid-state catalyst (3);

- a coolable heat exchanger area (4)

wherein the heat exchanger area (4) comprises at least one housing (5),

wherein the housing (5) accommodates at least partially an insert (6),

wherein the insert (6) comprises at least one of the following properties determined according to the test methods described herein:

(D) a heat pressure quotient $\Lambda 1$ at an empty pipe speed v of 0.485 m/s of greater than 1.11 $W/m^2/K/(mbar/m)$;

(E) a heat pressure quotient $\Lambda 2$ at an empty pipe speed v of 0.728 m/s of greater than 1.53 $W/m^2/K/(mbar/m)$;

(F) a heat pressure quotient $\Lambda 3$ at an empty pipe speed v of 0.970 m/s of greater than 1.81 $W/m^2/K/(mbar/m)$.

4. Reactor (1) according to claim 3, wherein the insert (6) comprises a plurality of elements.

5. Reactor (1) according to any one of the preceding claims, wherein the insert (6) has a degree of perforation of at least 30.

6. Reactor (1) according to any one of the preceding claims, wherein the elements (7) are formed from an at least partially fiber-like material (8).

7. Reactor (1) according to claim 6, wherein at least two of the plurality of elements (7) are formed in one piece from the at least partially fiber-like material (8).

8. Reactor (1) according to any one of the preceding claims, wherein at least a part of the plurality of elements (7) are arranged around a core (9).

9. Reactor (1) according to claim 8, wherein at least a part of the plurality of elements (7) are accommodated by the core (9).

10. Reactor (1) according to claim 8 or claim 9, wherein the core (9) is formed from at least two longitudinal elements (10).

11. Reactor (1) according to claim 10, wherein the at least two longitudinal elements (10) are twisted around each other to form one or more windings (11).

12. Reactor (1) according to claim 11, wherein at least one of the elements (7) is accommodated in the winding (11).

13. Reactor (1) according to any one of the preceding claims, wherein the plurality of elements (7) comprises wire.

14. Reactor (1) according to any one of claims 8 to 13, wherein the core (9) comprises wire.

15. Reactor (1) according to claim 13 or claim 14, whereby the wire is a metal wire.

16. Reactor (1) according to any one of the preceding claims, wherein the insert (6) at an inner space cross-section (12) of the housing (5) fills this inner space cross-section (12).

17. Reactor (1) according to any one of the preceding claims, wherein the housing (5) comprises a cylindrical inner space (13).

18. Reactor (1) according to any one of the preceding claims, wherein the insert (6) has a cylindrical form.

19. Reactor (1) according to any one of the preceding claims, wherein the housing (5) comprises an inner wall (14) which is contacted by a part of the plurality of elements (7).

20. Reactor (1) according to any one of the preceding claims, wherein at least a part of the plurality of elements (7) are loops.

21. Reactor (1) according to any one of the preceding claims, wherein at least one further reaction area (15) is connected to the heat exchanger area (4).

22. Reactor (1) according to claim 21, wherein the solid-state catalyst (3) in the reaction area (2) and a further catalyst (16) in the further reaction area (15) are different.

23. Reactor (1) according to any one of the preceding claims, wherein the insert (6) at least partially extends into the reaction area (2).

24. Reactor (1) according to claim 23, wherein the part of the insert (6) which extends into the reaction area (2) comprises a catalyst.

25. Reactor (1) with a reaction area (2) comprising an insert (6) as defined in any one of claims 2 to 15, 18 or 20, wherein this insert (6) comprises a catalyst.

26. Process for oxidation of a hydrocarbon, wherein the hydrocarbon as a gas in converted in a reactor according to any one of the preceding claims into an oxidised hydrocarbon product.

27. Process according to claim 26, wherein the hydrocarbon is unsaturated.

28. Process according to claim 27, wherein the hydrocarbon is propene.

29. Process according to any one of claims 26 to 28, wherein the oxidised hydrocarbon product is acrolein or acrylic acid.

30. Fibers, sheets, formed bodies, food or feed additives, pharmaceuticals, cosmetics, foams, superabsorbers, paper additives, leather additives or textile additives, comprising or based upon an oxidised hydrocarbon product according to any one of claims 26 to 29.

31. Use of an oxidised hydrocarbon product according to any one of claims 26 to 29 in or for fibers, sheets, formed bodies, food or feed additives, pharmaceuticals, cosmetics, foams, superabsorbers, paper additives, leather additives or textile additives.